

## AMENDMENTS TO THE CLAIMS

1 1. (Original) An apparatus adapted for seismic data acquisition in a land or transition zone  
2 environment, said apparatus comprising:  
3 a positioning device;  
4 a seismic sensor, capable of being placed near said positioning device; and  
5 means for determining the distance between said seismic sensor and said positioning  
6 device using an airborne acoustic transmission between said positioning device  
7 and said seismic sensor.

1 2. (Original) An apparatus as claimed in claim 1, in which said airborne acoustic  
2 transmission is produced by a speaker at said positioning device and received by a microphone at  
3 said seismic sensor.

1 3. (Canceled)

1 4. (Canceled)

1 5. (Canceled)

1 6. (Canceled)

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1 45. (Canceled)

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1 46. (New) The apparatus of claim 2, wherein said airborne acoustic transmission received by  
2 said microphone at said seismic sensor is converted from analog to digital format using an  
3 analog to digital converter that is also used to convert seismic signals received by said seismic  
4 sensor from analog to digital format.

1 47. (New) The apparatus of claim 2 wherein said airborne acoustic transmission received by  
2 said microphone at said seismic sensor is transmitted using a cable that is also used to transmit  
3 seismic data received by said seismic sensor.

1 48. (New) The apparatus of claim 1, wherein said airborne acoustic transmission is a spread  
2 spectrum acoustic signal.

1 49. (New) The apparatus of claim 1, wherein said airborne acoustic transmission is a pulse,  
2 frequency sweep, or digitally encoded sweep acoustic signal.

1 50. (New) The apparatus of claim 1, wherein said airborne acoustic transmission is generated  
2 by signal generation circuitry that is also used to test said seismic sensor.

1 51. (New) The apparatus of claim 1, further including a temperature sensor for measuring the  
2 temperature of the air near said seismic sensor or said positioning device.

1 52. (New) The apparatus of claim 1, further including a survey flag and wherein said  
2 positioning device is placed near said survey flag.

1 53. (New) The apparatus of claim 1, wherein said positioning device is a first positioning  
2 device and further including a second positioning device and means for determining the distance  
3 between said second positioning device and said seismic sensor using an airborne acoustic  
4 transmission between said second positioning device and said seismic sensor.

1 54. (New) The apparatus of claim 53, further including means for determining the distance  
2 between said first positioning device and said second positioning device.

1 55. (New) The apparatus of claim 54, wherein said means for determining the distance  
2 between said first positioning device and said second positioning device uses an airborne  
3 acoustic transmission between said first positioning device and said second positioning device.

1 56. (New) The apparatus of claim 53, wherein said first positioning device and said second  
2 positioning device are connected by a cable.

1 57. (New) The apparatus of claim 53, wherein said second positioning device is placed at a  
2 predetermined azimuthal orientation with respect to said first positioning device.

1 58. (New) The apparatus of claim 53, further including means for confirming that said  
2 second positioning device has been placed at a predetermined azimuthal orientation with respect  
3 to said first positioning device.

1 59. (New) The apparatus of claim 53, wherein a seismic source signal is used to resolve the  
2 line symmetry ambiguity when determining the position of said seismic sensor with respect to  
3 said first positioning device and said second positioning device.

1 60. (New) The apparatus of claim 1, wherein said seismic sensor is a first seismic sensor and  
2 further including additional seismic sensors and means for determining the distance between said  
3 additional seismic sensors and said positioning device using airborne acoustic transmission  
4 between said positioning device and said additional seismic sensors.

1 61. (New) The apparatus of claim 60, further including means for calculating a group center  
2 of gravity for said first seismic sensor and said additional seismic sensors.

1 62. (New) The apparatus of claim 60, further including means for determining whether said  
2 first seismic sensor and said additional seismic sensors have been laid out in a prescribed order.

1 63. (New) The apparatus of claim 1, wherein said seismic sensor and said positioning device  
2 are located at a first seismic station and further including an additional positioning device located  
3 at a second seismic station and means for determining the distance between a device located at  
4 said first seismic station and a device located at said second seismic station.

1 64. (New) A method of determining the position of a seismic sensor adapted for seismic data  
2 acquisition in a land or transition zone environment, said method comprising the steps of:  
3 placing a positioning device in a particular location;  
4 placing a seismic sensor near said positioning device; and  
5 determining the distance between said seismic sensor and said positioning device using  
6 an airborne acoustic transmission between said positioning device and said  
7 seismic sensor.

1 65. (New) The method of claim 64, wherein said airborne acoustic transmission is produced  
2 by a speaker at said positioning device and received by a microphone at said seismic sensor.

1 66. (New) The method of claim 65, wherein said airborne acoustic transmission received by  
2 said microphone at said seismic sensor is converted from analog to digital format using an  
3 analog to digital converter that is also used to convert seismic signals received by said seismic  
4 sensor from analog to digital format.

1 67. (New) The method of claim 65, wherein said airborne acoustic transmission received by  
2 said microphone at said seismic sensor is transmitted using a cable that is also used to transmit  
3 seismic data received by said seismic sensor.

1 68. (New) The method of claim 64, wherein said airborne acoustic transmission is a spread  
2 spectrum acoustic signal.

1 69. (New) The method of claim 65, wherein said airborne acoustic transmission is a pulse,  
2 frequency sweep, or digitally encoded sweep acoustic signal.

1 70. (New) The method of claim 64, wherein said airborne acoustic transmission is generated  
2 by signal generation circuitry that is also used to test said seismic sensor.

1 71. (New) The method of claim 64, further including the step of measuring the temperature  
2 of the air near said seismic sensor or said positioning device.

1 72. (New) The method of claim 64, wherein said positioning device is placed near a survey  
2 flag.

1 73. (New) The method of claim 64, wherein said positioning device is a first positioning  
2 device and further including the step of determining the distance between a second positioning  
3 device and said seismic sensor using an airborne acoustic transmission between said second  
4 positioning device and said seismic sensor.

1 74. (New) The method of claim 73, further including the step of determining the distance  
2 between said first positioning device and said second positioning device.

1 75. (New) The method of claim 74, wherein said step of determining the distance between  
2 said first positioning device and said second positioning device uses an airborne acoustic  
3 transmission between said first positioning device and said second positioning device.

1 76. (New) The method of claim 73, wherein said first positioning device and said second  
2 positioning device are connected by a cable.

1 77. (New) The method of claim 73, wherein said second positioning device is placed at a  
2 predetermined azimuthal orientation with respect to said first positioning device.

1 78. (New) The method of claim 73, further including the step of confirming that said second  
2 positioning device has been placed at a predetermined azimuthal orientation with respect to said  
3 first positioning device.

1 79. (New) The method of claim 73, wherein a seismic source signal is used to determine to  
2 resolve the line symmetry ambiguity when determining the position of said seismic sensor with  
3 respect to said first positioning device and said second positioning device.

1 80. (New) The method of claim 64, wherein said seismic sensor is a first seismic sensor and  
2 further including additional seismic sensors and the step of determining the distance between  
3 said additional seismic sensors and said positioning device using airborne acoustic transmissions  
4 between said positioning device and said additional seismic sensors.

1 81. (New) The method of claim 80, further including the step of calculating a group center of  
2 gravity for said first seismic sensor and said additional seismic sensors.

1 82. (New) The method of claim 80, further including the step of determining whether said  
2 first seismic sensor and said additional seismic sensors have been laid out in a prescribed order.

1 83. (New) The method of claim 64, wherein said seismic sensor and said positioning device  
2 are located at a first seismic station and further including an additional positioning device located  
3 at a second seismic station and the step of determining the distance between a device located at  
4 said first seismic station and a device located at said second seismic station.

1 84. (New) The method of claim 64, further including the steps of recording seismic data  
2 acquired by said seismic sensor and assigning sensor position coordinates to said seismic data  
3 based on said distance between said seismic sensor and said positioning device.

1 85. (New) The method of claim 64, further including the step of calculating a deviation  
2 between actual seismic sensor position coordinates and planned seismic sensor position  
3 coordinates.

1 86. (New) The method of claim 85, further including the step of compensating for said  
2 deviation between said actual seismic sensor position coordinates and said planned seismic  
3 sensor position coordinates.

1 87. (New) The method of claim 86, wherein said compensation step includes mathematically  
2 moving a group center of gravity from an actual position to a planned position.

1 88. (New) The method of claim 87, wherein said compensation step includes bypassing a  
2 digital ground roll removal process.

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